National Park Service
U.S. Department of the Interior

Lake Clark National Park and Preserve

Wolf Ecology in Lake Clark National Park and Preserve

EXPERIENCE YOUR AMERICA

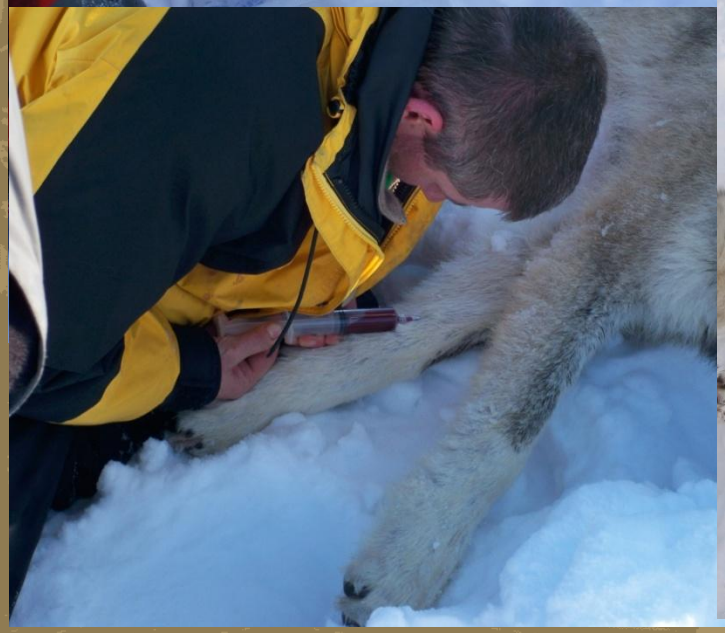
Why wolves?

- Declines of 25-33% in moose populations within Lake Clark National Park and Preserve (LACL) since 2003.
- Local users expressing that predation, primarily wolf, was causing this decline.
- Regulatory changes liberalizing wolf harvest via trapping and hunting in the region.
- Limited data on the status of wolf populations in LACL.

Study Objectives

- Determine the number of wolf packs and their size in Lake Clark National Park and Preserve (LACL).
- Determine pack territory size and how pack territories are arranged on the landscape.
- Determine movement patterns and dispersal rates.
- Determine wolf pack productivity and wolf mortality.
- Determine wolf prey composition and predation rate.

Wolf Capture



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Wolf Capture Data

Date	Wolf ID	Sex	Age	Weight (KG)	Pack	Transimtter Type	Recapture
12/4/2008	LC0801	M	PUP	24.5	TELAQUANA LAKE	SATELLITE	NO
12/5/2008	LC0802	M	ADULT	48.6	TELAQUANA LAKE	GPS	NO
2/6/2009	LC0903	M	ADULT	50.0	CHULITNA RIVER	GPS	NO
2/6/2009	LC0904	F	YEARLING	34.5	CHULITNA RIVER	SATELLITE	NO
2/7/2009	LC0905	F	ADULT	40.9	KIJIK RIVER	GPS	NO
2/7/2009	LC0906	F	ADULT	43.2	CHEKOK CREEK	GPS	NO
2/7/2009	LC0907	F	PUP	36.4	CHEKOK CREEK	SATELLITE	NO
2/8/2009	LC0908	M	ADULT	50.9	KIJIK RIVER	GPS	NO
2/7/2010	LC1011	M	PUP	40.9	CHEKOK CREEK	SATELLITE	NO
2/7/2010	LC0906	F	ADULT	51.4	CHEKOK CREEK	GPS	YES
2/7/2010	LC0907	F	YEARLING	43.2	CHEKOK CREEK	GPS	YES
2/8/2010	LC1013	M	YEARLING	46.4	PTARMIGAN CREEK	GPS	NO
2/8/2010	LC0802	M	ADULT	53.6	TELAQUANA LAKE	GPS	YES
2/12/2010	LC1014	M	PUP	38.2	TELAQUANA LAKE	SATELLITE	NO
2/28/2011	LC1115	M	ADULT	54.5	LOWER TWIN LAKE	GPS	NO
2/28/2011	LC1116	F	YEARLING	35.5	LOWER TWIN LAKE	VHF	NO
3/1/2011	LC1117	M	ADULT	55.5	TWIN LAKES-TELAQUANA	GPS	NO
3/1/2011	LC1118	M	YEARLING	49.1	TWIN LAKES	GPS	NO
3/1/2011	LC1119	M	PUP	43.6	TWIN LAKES-TELAQUANA	GPS	NO
3/2/2011	LC1120	M	ADULT	54.5	CHEKOK CREEK	GPS	NO
3/2/2011	LC0906	F	ADULT	46.4	CHEKOK CREEK	GPS	YES

Project Capture Summary

- Twenty-one wolves have been caught during 4 captures between 2008-2011.
- The 21 wolves are part of 5 packs that are distributed along the western and southern boundaries of LACL.
- Age-class composition was 11 Adults, 5 Yearlings, and 5 Pups.
- Thirteen males and 8 females were captured.
- The heaviest wolf was 55.5kg and the lightest was 24.5 kg.
- Several wolves were captured in multiple years, with one caught in 2009, 2010, and 2011.

Wolf Pack Data

Wolf pack sizes in Lake Clark National Park and Preserve, December 2008-October 2011

Pack	Number of Wolves 2008-2009	Number of Wolves 2009-2010	Number of Wolves 2010-2011
Chulitna	7	NA	NA
Telaquana	5	6	4
Chekok	6	6	5
Kijik	6	6[1]	3[1]
Ptarmigan	NA	4	NA

Pack size is from early winter and represents maximum for that pack/year.

[1] No radio-collars were in this pack, estimates based on aerial and ground observations

Wolf Productivity and Mortality

Productivity and Mortality

- Seven den sites have been documented with 5 producing pups.
- Productive dens produced between 2 and 6 pups.
- Autumn tracking flights have determined that no more than 4 pups have survived and/or remained with their natal pack.
- Eight radio-collared wolves have died during the study: 2 in 2008-09, 3 in 2009-10, and 3 in 2010-11.
- Cause of mortality has been 3 harvested, 2 intraspecific strife, 2 unknown cause, and 1 drowning.

Wolf Territories

Annual wolf pack territory size (km^2) in Lake Clark National Park and Preserve, Alaska

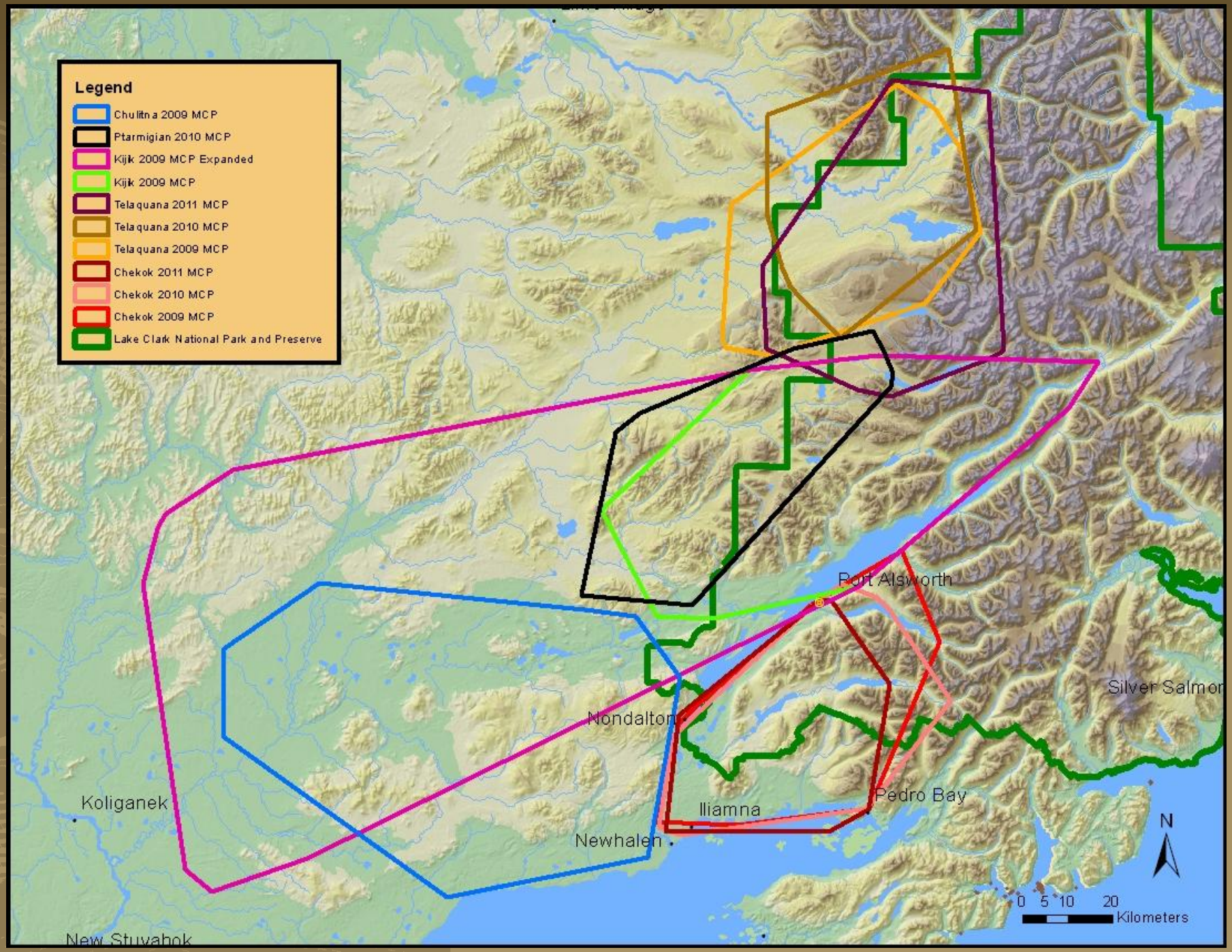
Pack	2009	2010	2011[1]
Chulitna	5277	NA	NA
Telaquana	2274	2060	2791[2]
Chekok	2269	2183	1831
Kijik	3914[3] (13134)	NA	NA
Ptarmigan	NA	2264	NA

Territories based on Minimum Convex Polygon using pack locations, excluding dispersal movements.

[1] Using locations collected 1 January – 30 September 2001.

[2] New pack of wolves in previously occupied territory.

[3] Territory excluding and including westward expansion.


Legend
Chulitna 2009 MCP
Ptarmigian 2010 MCP
Kijik 2009 MCP Expanded
Kijik 2009 MCP
Telaquana 2011 MCP
Telaquana 2010 MCP
Telaquana 2009 MCP
Chekok 2011 MCP
Chekok 2010 MCP
Chekok 2009 MCP
Lake Clark National Park and Preserve
Port Alsworth
Nondalton
Koliganek
Iliamna
Pedro Bay
Newhalen
Silver Salmon
New Stuyahok
N
0 5 10 20
Kilometers

Annual wolf pack territory size (km^2) in Lake Clark National Park and Preserve, Alaska

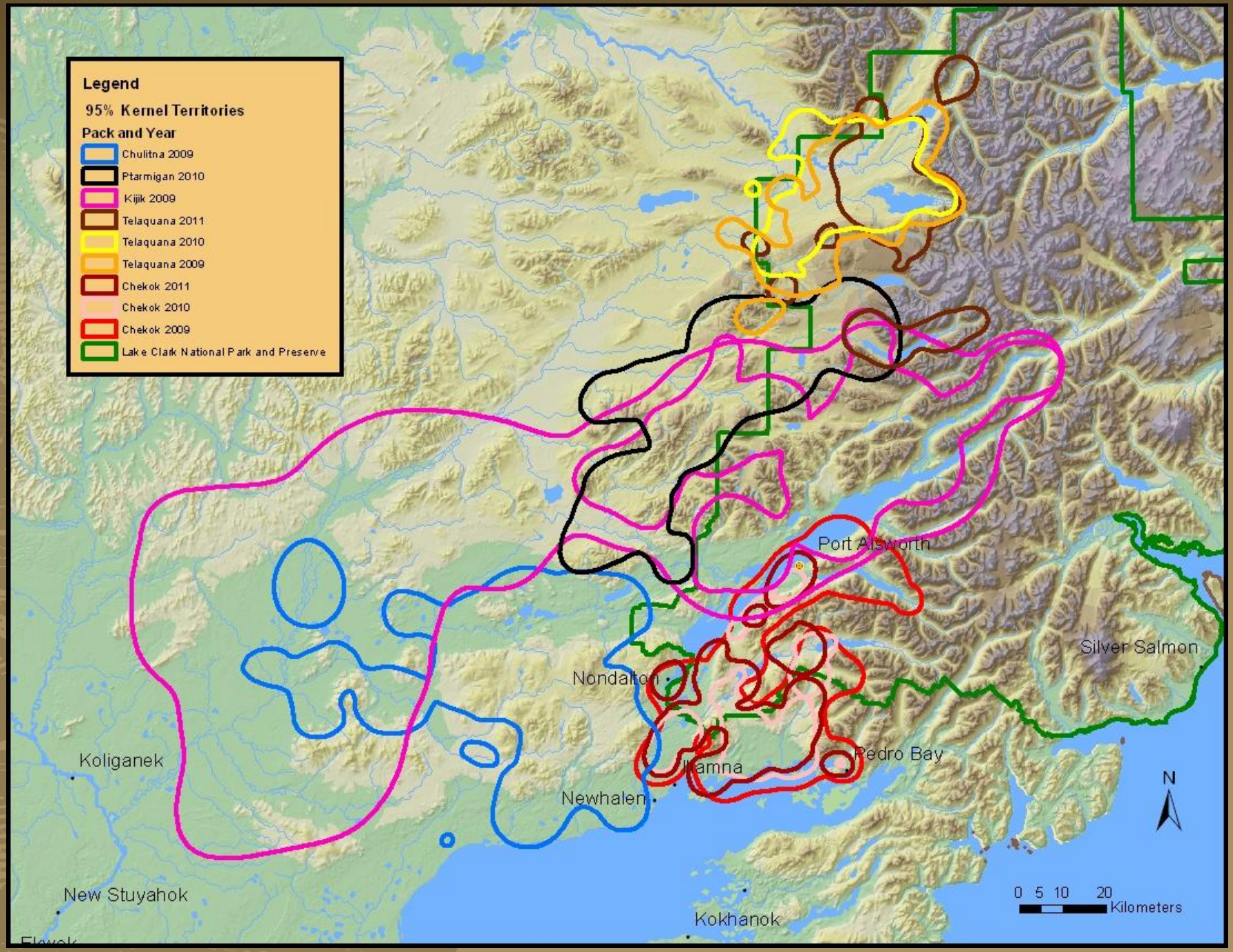
Pack	2009	2010	2011[1]
Chulitna	3261	NA	NA
Telaquana	1228	991	1158[2]
Chekok	1980	683	1092
Kijik	3119[3] (11356)	NA	NA
Ptarmigan	NA	2236	NA

Territories based on 95% Fixed Kernel using pack locations, excluding dispersal movements.

[1] Using locations collected 1 January – 30 September 2001.

[2] New pack of wolves in previously occupied territory.

[3] Territory excluding and including westward expansion.


Legend
95% Kernel Territories
Pack and Year
Chulitna 2009
Ptarmigan 2010
Kijik 2009
Telaquana 2011
Telaquana 2010
Telaquana 2009
Chekok 2011
Chekok 2010
Chekok 2009
Lake Clark National Park and Preserve
Port Alsworth
Silver Salmon
Nondalton
Pedro Bay
Iliamna
Newhalen
Koliganek
New Stuyahok
Kokhanok
N
0 5 10 20
Kilometers

Pack Territories

- We have documented 5 pack territories in the western interior of LACL. With the possibility of 2 additional small territories during the 3 years studied.
- Territories (MCP) averaged 2763 km^2. In LACL, territories have ranged from 1831 km^2 To 5277 km^2.
- Territories in LACL are generally larger than others in Alaska.
- It appears that wolf packs that utilize salmon have smaller, more defined territories.

Territory Use

Photo by Jeanette Mills

Location and Territory Land Status

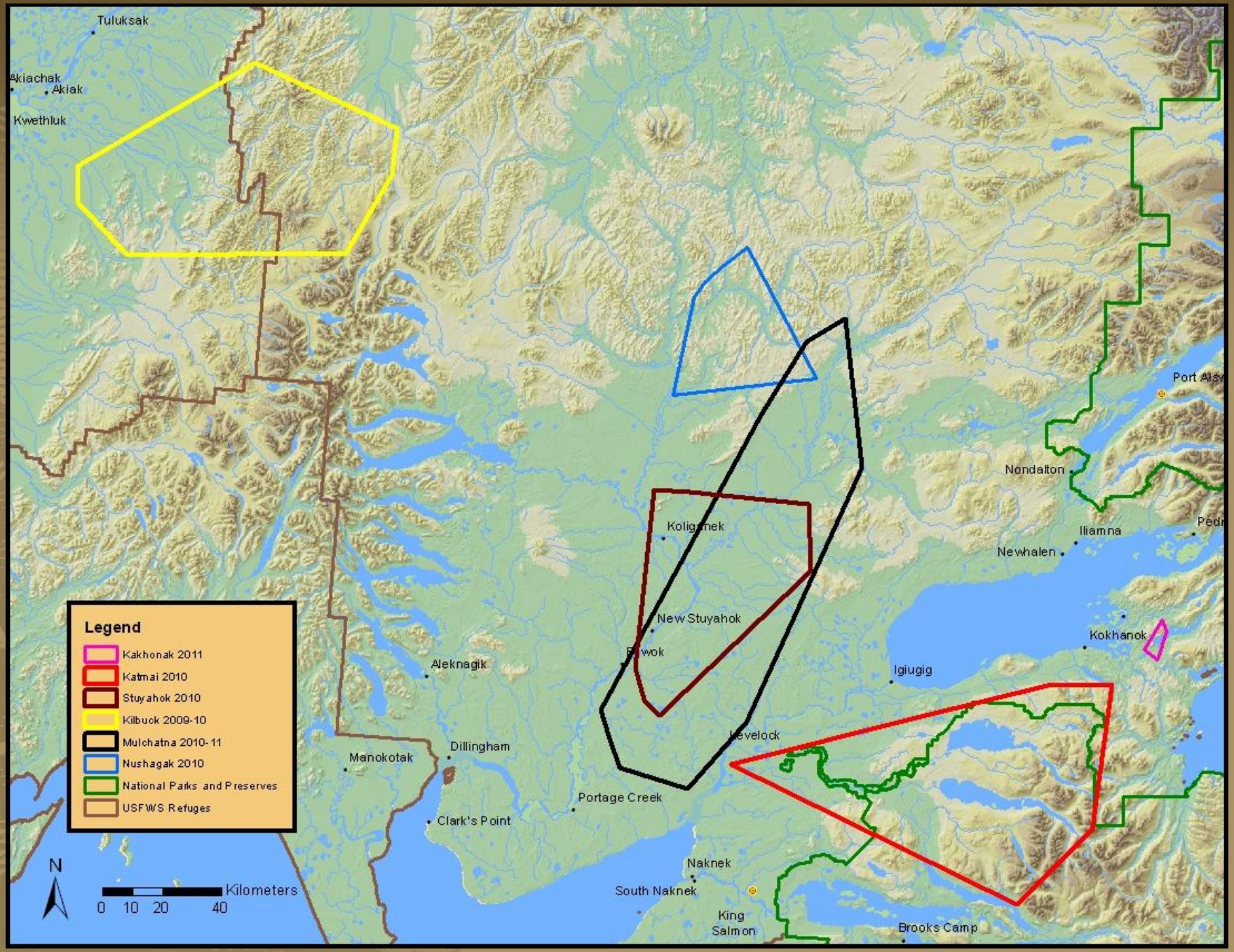
Pack	Year	% Territory NPS	% Territory Other	% Locations NPS	% Location Other
Chulitna	2009	0.9%	99.1%	0.4%	99.6%
Chekok	2009	62.4%	37.6%	48.8%	51.2%
Chekok	2010	58.3%	41.7%	20.7%	79.3%
Chekok	2011	50.3%	49.6%	41.0%	59.0%
Kijik	2009	22.5%	77.8%	30.1%	69.9%
Telaquana	2009	66.8%	33.2%	90.7%	9.3%
Telaquana	2010	68.9%	31.1%	88.8%	11.2%
Telaquana	2011	88.9%	11.0%	95.3%	2.8%
Ptarmigan	2010	27.3%	72.8%	28.8%	71.2%

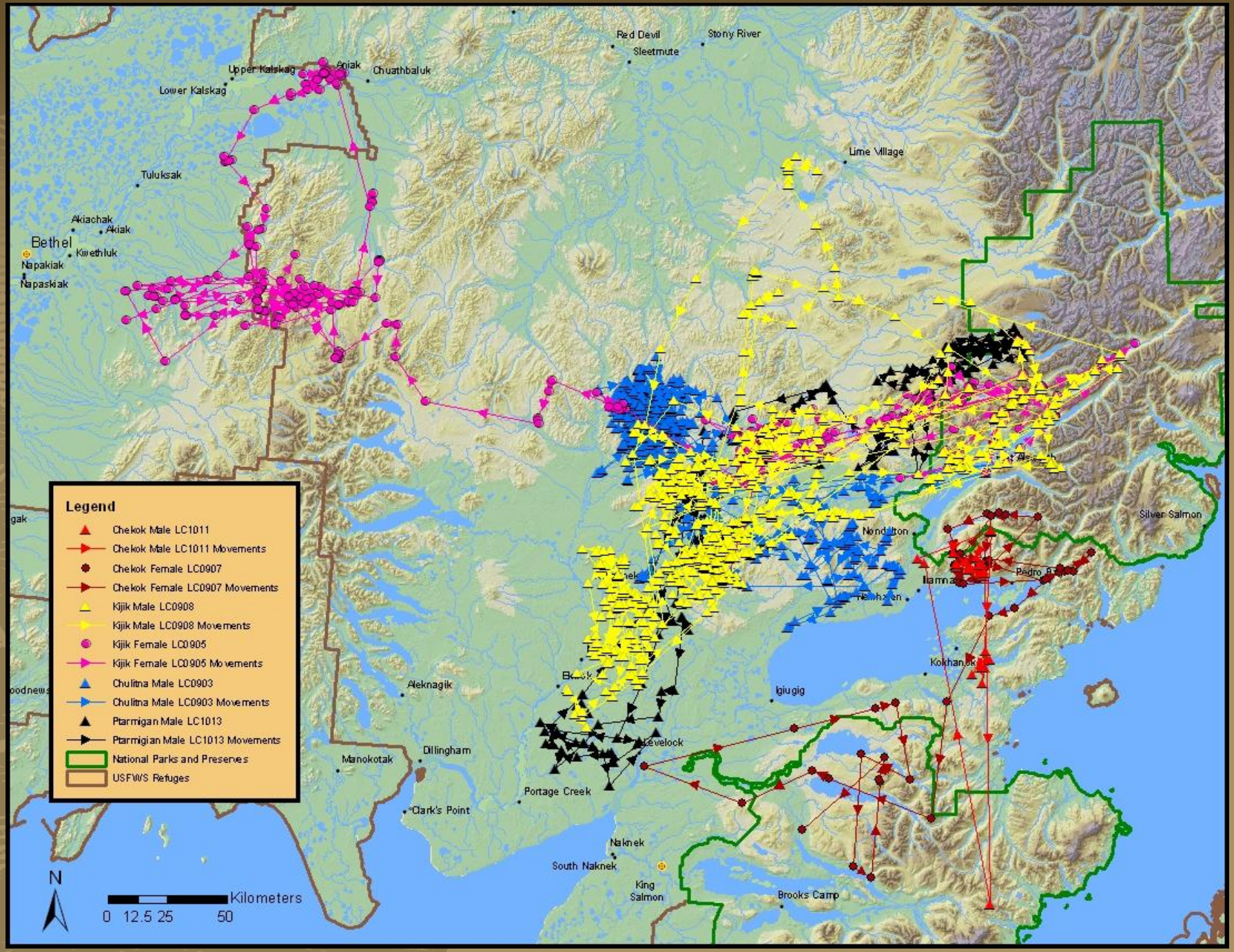
Wolf Dispersal

Dispersal Data

Pack	Age Class	Sex	Date	Direction	Distance (KM)	Status
Kijik	Yearling	Female	8/28/2009	NW	253	Mortality
Kijik	Adult	Male	2/16/2010	SW	110	Collar Release
Chulitna	Adult	Male	6/18/2009	NW	77	Collar Release
Chekok	Yearling	Female	4/19/2010	S	120	Unknown
Chekok	Yearling	Male	1/15/2011[1]	S	53	Active
Ptarmigan	Yearling	Male	8/29/2010	SW	150	Mortality

[1] Estimated date of dispersal.


Tuluksak
Akiachak
Akiak
Kwethluk
Port Alsy
Nondalton
Iliamna
Newhalen
Koliganek
New Stuyahok
Kokhanok
Igiugig
Aleknagik
Levelock
Dillingham
Manokotak
Portage Creek
Clark's Point
Naknek
South Naknek
King Salmon
Brooks Camp
Legend
Kakhonak 2011
Katmai 2010
Stuyahok 2010
Kilbuck 2009-10
Mulchatna 2010-11
Nushagak 2010
National Parks and Preserves
USFWS Refuges
N
0 10 20 40
Kilometers


Red Devil
Stony River
Sleetmute
Upper Kalskag
Aniak
Chuathbaluk
Lower Kalskag
Lime Village
Tuluksak
Akiachak
Akiak
Bethel
Kwethluk
Napakiak
Napaskiak
Silver Salmon
Nondalton
Iliamna
Pedro Bay
Kokhanok
Igiugig
Aleknagik
Dillingham
Manokotak
Levelock
Portage Creek
Clark's Point
Naknek
South Naknek
King Salmon
Brooks Camp
Legend
Chekok Male LC1011
Chekok Male LC1011 Movements
Chekok Female LC0907
Chekok Female LC0907 Movements
Kijik Male LC0908
Kijik Male LC0908 Movements
Kijik Female LC0905
Kijik Female LC0905 Movements
Chulitna Male LC0903
Chulitna Male LC0903 Movements
Ptarmigan Male LC1013
Ptarmigian Male LC1013 Movements
National Parks and Preserves
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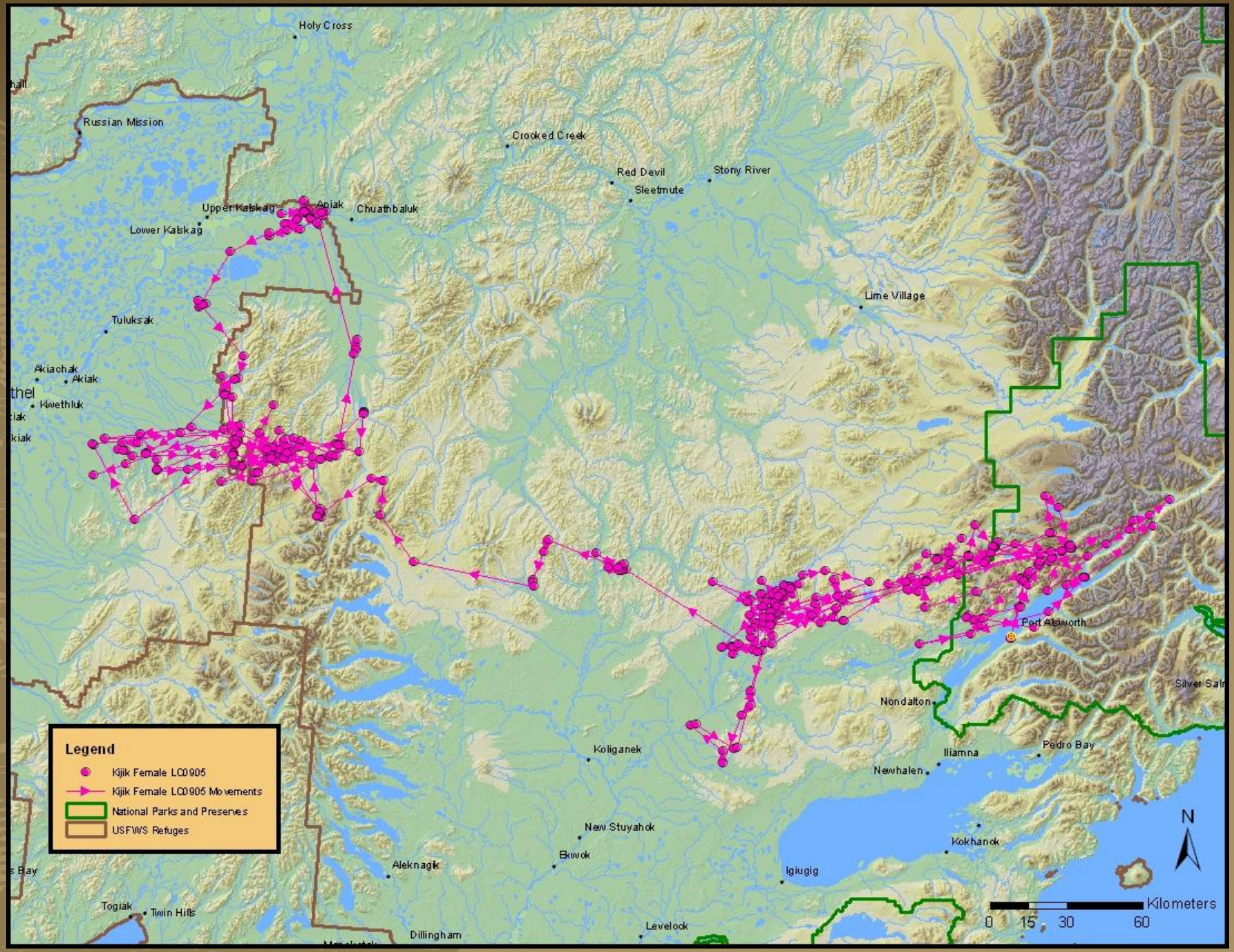
Holy Cross
Russian Mission
Crooked Creek
Red Devil
Stony River
Sleetmute
Upper Kalskag
Aniak
Chuathbaluk
Lower Kalskag
Lime Village
Tuluksak
Akiachak
Akiak
Kwethluk
Port Alsworth
Nondalton
Silver Salm
Koliganek
Iliamna
Pedro Bay
Newhalen
New Stuyahok
Ekwok
Kokhanok
Aleknagik
Igiugig
Togiak
Twin Hills
Dillingham
Levelock
Legend
Kijik Female LC0905
Kijik Female LC0905 Movements
National Parks and Preserves
USFWS Refuges
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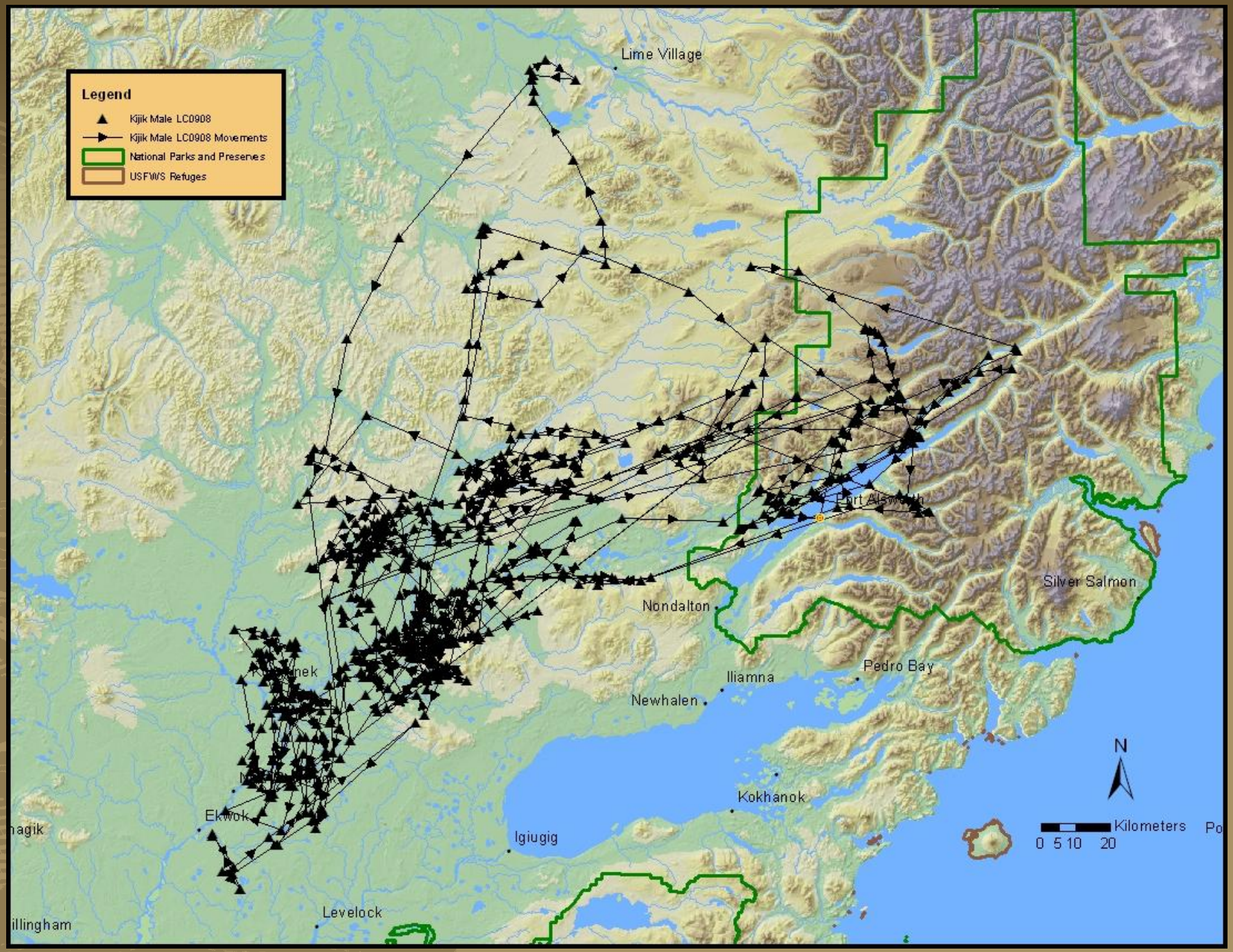
Kilometers
0 15 30 60


Legend
Kijik Male LC0908
Kijik Male LC0908 Movements
National Parks and Preserves
USFWS Refuges
Lime Village
Port Alsworth
Silver Salmon
Nondalton
Pedro Bay
Iliamna
Newhalen
Kokhanok
Igiugig
Ekwok
Levelock
N
Kilometers
0 5 10 20


Legend
Chekok Male LC1011
Chekok Male LC1011 Movements
Chekok Female LC0907
Chekok Female LC0907 Movements
National Parks and Preserves
USFWS Refuges
Nondalton
Iliamna
Pedro Bay
Newhalen
Koliganek
New Stuyahok
Kokhanok
Igiugig
Levelock
Naknek
Naknek
King Salmon
Brooks Camp
N
Kilometers
0 5 10 20

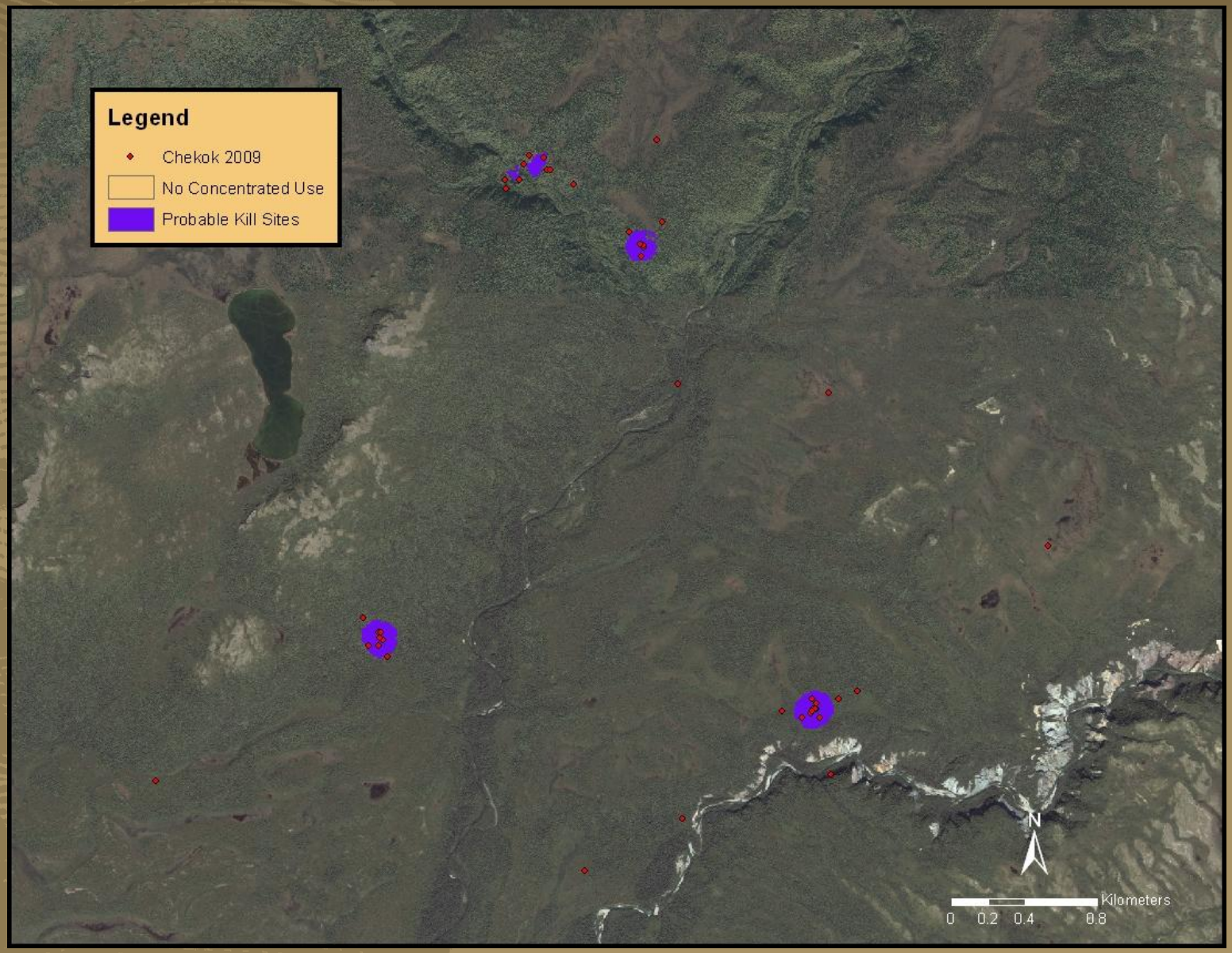
Prey Composition and Quantity

Winter Prey Use

Pack	Year	Winter Period	Total Kills	Verified Kills	Days/Kill	Days at Kills	Days between kills
Chekok	2009	Late[1]	6	3	14	9.0	9
Chekok	2009	Early	3	1	20	6.0	6
Chekok	2010	Late	5	2	24	8.0	12
Chekok	2010	Early	2	1	31	7.5	11
Chekok	2011	Late	6	1	20	7.7	15
Chulitna	2009	Late[1]	5	1	17	3.8	11.25
Kijik	2009	Late[1]	4	3	21	5.8	19
Telaquana	2009	Late	5	3	24	6.4	18
Telaquana	2010	Late[1]	5	4	24	5.8	10
Telaquana	2011	Late[1]	3	2	20	7.7	14

[1] Capture dates were during this period so the estimate is based on a shorter late winter period.

Point Density Analysis



Summary

- Pack Size: Our average pack sizes are small with few retaining animals once they reach yearling age
- Territories: Territories are large which may be due to the small prey base requiring more territory to meet pack needs.
- Dispersal: All yearlings and some adults disperse with areas west of LACL receiving most of the wolves.
- Productivity and mortality
- Prey composition and quantity: Moose are the primary terrestrial prey, but use of salmon appears to be common in several packs.

Future Work

- Complete the final analysis and report for this project.
- Begin to study wolves of coastal Lake Clark National Park and Preserve with the focus on movements and foraging patterns.
- Collect historic and current samples from wolves within southwest Alaska to assess spatial and temporal dietary differences in wolves.

Acknowledgements

We would like to express our gratitude to a multitude of individuals who assisted both directly and indirectly with this project:

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Questions?